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ABSTRACT

A variety of causes have been suggested for hyperactivity: anoxia and other adverse birth conditions, genetic factors, delayed maturation, maternal smoking and drinking during pregnancy, interaction of temperament and environment, lead poisoning, radiation stress, allergy and food additives, and deprivation of required stimulation. Treatments include drug treatments, especially with Ritalin or Dexedrine; the Feingold diet restricting sugars and artificial colorings; administration of megavitamins; behavior therapy; differential reinforcement procedures; modeling; role-playing; filial therapy (helping parents develop empathy with their children); and brief therapy (isolating specific complaints and attempting to bring about an observable behavior change). Possible educational involvement with the hyperactive includes developing minimal stimulation programs; developing structured, predictable, consistent, and logical programs; having engineered classrooms; creating insight-oriented therapy groups to help parents understand their feelings and make necessary changes at home; behavior modification programs; self-instructional training; relaxation training; and biofeedback. Cooperation between parents, teachers, and physicians is important in treating children who are hyperactive. (TJ)

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THE ROLE OF DRUGS, DIET, AND FOOD ADDITIVES IN HYPERACTIVITY

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Where were hyperactive children in 1940? Indeed, where are the hyperactive children in British schools today? It is worth noting that in 1940 -- without a convenient label at hand, such children would have been considered emotionally disturbed, disobedient, distractable, or even downright ornery. In England, even today, only one child in a thousand is so active, distractable, and excitable that he is considered unusual; at the same time, the incidence of hyperactivity has reached almost epidemic proportions in the United States.

Are we as educators in fact using medication to control deviant or unwanted behavior? It was in an attempt to answer this and related questions that an extensive review of professional literature was undertaken. This review will be divided into three parts: the first will deal with possible causes of hyperactivity; the second will deal with suggested treatments, and the third section will deal with ethical implications for teachers and physicians.

One of the major difficulties in discussing hyperactivity is a lack of agreement about a definition. The terms most frequently used--hyperactivity and hyperkinetic syndrome--are usually defined in descriptive terms as distractable, impulsive, immature, clumsy or awkward, restless, talkative, antisocial and below average in school performance. However, most of the research that has attempted to establish "clustering" or intercorrelations among these traits have yielded little evidence of a global syndrome. Instead, research suggests that there are a number of medical and behavioral disorders which have hyperactivity as one symptom. Frequently, additional negative behaviors develop as responses to the reactions of adult authority figures to undesirable activity. The association of these secondary symptoms appears to be responsible for the wide-spread belief in a hyperactive syndrome.

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Unfortunately, as Ross and Ross (1976) point out, the label hyperactive child syndrome implies that hyperactive children form a homogeneous group, easily identified by a common core of symptoms and readily yielding to one standard treatment. Contrary to this common belief, hyperactivity is an umbrella-term currently being used to refer to a number of heterogeneous patterns of inappropriate behavior which the individual cannot inhibit even when he is under considerable social pressure. This pattern can appear in early infancy and persist through adulthood. Until recently, it was maintained that hyperactive behavior tended to diminish during adolescence. A study completed in 1974 (Huessy, Metoyer, and Townsend) confirms earlier studies suggesting that former hyperactive children continue to have difficulties in adolescence. In fact a follow-up study by Huessy found the hyperactive child to be high-risk in terms of academic, social and emotional problems in later life.

It is possible that the myth of the disappearance of hyperactivity in adolescence and adulthood is the result of flexible demands upon adults. Adult life does offer the hyperactive individual more options than are available in school and thus may permit certain individuals to function more adequately.

Probably because of medicine's success in controlling or curing illnesses once a cause has been identified, a variety of causes have been suggested for hyperactivity.

1. Anoxia and other adverse birth conditions.

It is understandable that the historical link between hyperactivity and minimal brain damage, associated as it is with slight neurological impairments such as "soft signs" and perceptual difficulties, would lead to a possible causal association with adverse birth conditions. However, evidence does not support the association in the cases of the majority of hyperactive children.

2. Genetic factors.

Several research studies suggest that some type of relationship may exist. At present, the findings suggest a polygenetic mode of transmission. Clinicians have noted the restlessness and short attention span of fathers of hyperactive children and hypothesized that they were probably hyperactive. Several check lists have been constructed which list a number of slight physical anomalies. Several physicians report that the presence of several of these in a single individual may indicate the possibility of hyperactivity.

3. Delayed maturation or maturational lag.

Several investigators have collected evidence supporting the concept of delayed or irregular maturation as a factor in certain hyperactive children.

4. Maternal smoking and drinking.

A 1975 study (Denson, Manson and McWalters) reported that mothers of hyperactive children smoked more during pregnancy than the mothers of a control group of children. It should be noted that this study has not been replicated nor fully evaluated at present. It is generally recognized that the fetal brain is apparently very susceptable to damage from alcohol. It therefore appears highly possible that infants suffering from fetal alcohol syndrome could be hyperactive.

5. Interaction of temperment and environment.

Bettelheim, Chess and Thomas have suggested that a mother's behavior is determined in great part by the infant's behavior, just as an infant's behavior can be influenced greatly by the mother's behavior. An infant may become cranky and restless if a mother is impatient and resentful when she cares for him; a mother may become resentful and critical if the child is cross and difficult. The negative behavior patterns of one heightens negative behavior patterns in the other. It might be noted here that roughly five percent of babies are considered "difficult" while from fifteen to twenty percent are classified as

"slow to warm up."

6. Lead poisoning.

Even today, lead poisoning among children in the United States is widespread enough to be called a silent epidemic (Needleman, 1973). Lead poisoning is frequently linked to chips of old paint; however, high octane lead gasoline is another major source of difficulty. Children may inhale lead from automobile fumes or ingest it by eating snow or dirt along city streets or highways. Davis is currently conducting a three year study of the relationship between hyperactivity and body lead levels in children. Preliminary data suggests an association between lead and hyperactivity.

7. Radiation stress.

Evidence, including anecdotal accounts of children and studies with animals, has suggested that harmful and inadequate fluorescent lighting and unshielded TV cathode tubes may result in sufficient radiation exposure to influence behavior adversely.

8. Allergy and food additives.

Since there are over 1000 food additives used in an array of unlikely products, (chewy vitamins, toothpaste, decongestants), it is evident that the chance of an individual having an adverse or allergic reaction to one is quite high. The annual additive intake per American was four pounds in 1971 and five pounds by 1974.

A recent book on food allergies clearly establishes that one possible symptom of an allergic condition is hyperactivity. It has been stated that one out of every seven people in the United States suffers from an allergic disease. (Somekh, 1974) Anecdotal records of children who were labeled hyperactive but who were found to be allergic to some substance, (milk, wheat, printer's ink) abound. Feingold's theory about the role of natural salicylate and synthetic coloring has received much publicity. Several studies are underway which may

provide additional information. One of the difficulties in testing Feingold's hypothesis seems to be that parents are unreliable about following medication and dietary restrictions completely. A "live-in" situation would seem to be required, and that in itself is an artificial environment.

9. Deprivation of required stimulation.

According to Leuba, every individual, in order to maintain physiological and psychological effectiveness, requires a particular, individual level of total stimulation. Each organism strives for a state of optimum stimulation and learns to adjust his own level of activity to changes in stimulation within the environment. (Ross and Ross, 198).

The onset of the "epidemic" of hyperactivity which began about eight to ten years ago has resulted in a plethora of suggested "cures". It is important to remember that hyperactivity is a symptom and that the underlying cause of hyperactivity usually requires a multimodality treatment; the three major modes utilized are pharamacological, psychotherapeutic, and environmental manipulative.

1. Drug treatment.

Almost without question, the most widespread treatment, or the "treatment of choice," as physicians refer to it, is drug treatment. Again, the drug most frequently utilized is one of those recognized as a stimulant to the central nervous system. Ritalin or, less frequently, Dexedrine are the drugs usually prescribed for hyperactive children. Actually, little sound research has been conducted with these drugs. Very few direct comparisons of the effectiveness of the two have been done. The study that is generally viewed as tipping the physician's choice toward Ritalin was actually full of methodological flaws. Even the appropriate dosage is a matter of considerable debate. The only research on the general behavioral effect in hyperactive children (Sprague and Werry, 1971, 1974) has shown that there is no increase in drug effectiveness for an average nine-year old boy beyond the equivalent of 10 mg. per day, a dosage

level substantially lower than the dosages commonly prescribed.

Some clinicians prefer standardized doses--others individually titrated doses--that is, beginning with small doses, gradually increasing until a satisfactory reduction in hyperactivity occurs or until undesirable side effects manifest themselves to a degree that no additional increase in dosage is desirable.

Dexodrine can be administered in a sustained release capsule over a six to eighteen hour span. The sustained release capsule has a less precipitous drop-off effect than a regular capsule and in some cases only one dose a day is required. The median effective dose is reported as 20 mg. per day.

Ritalin is less potent than Dexodrine--in fact it is usually treated as half as potent. Recommended doses range from 20 to 100 mg. per day, with many children reported to be taking 200 mg. per day. Several factors seem to influence the effectiveness of Ritalin. Overweight children are reported not to respond well to it. Several researchers state that if liquid Ritalin is used, dosages can be cut in half. It is generally agreed that few children can be maintained on a single morning dose of Ritalin. Most children require a second dose at noon. It should be noted that the effectiveness of stimulant drugs for a pre-school hyperactive child is questionable. In fact, the frequency of positive response to stimulant medication is debatable. Some authorities claim 70% positive drug response. Fish (Office of Child Development) maintains that from one-third to one-half of children experience an immediate and positive response. She also maintains that the result is rapid "when it works," and that children need to be kept on medications for only a short time to determine if the drug will be effective. Other experts feel that it may take a two week trial period to determine if the medication will be successful.

The side effects of these drugs are frequently mentioned. Naturally, all children do not experience these. When they do, the effects appear to be

related to the size of the dosage. The most frequently mentioned side effects of these stimulants are insomnia and suppression of the appetite, both of which occur more frequently with Dexodrine than with Ritalin. Two long-term side effects that are currently being investigated are those of increased heart rate and growth suppression. Actually, present data suggests a delay of growth rather than a suppression of it.

Several new studies have suggested a possible relationship between the use of amphetamines and the onset of Hodgkin's disease. Furthermore, there are increasing reports in the literature about such problems as grand mal seizure, hallucinosis, and drug-related psychosis and an association with amphetamines. At present, the explanation for the development of these last named difficulties is that the drug triggered the onset of the new problem in a vulnerable patient.

Still another aspect of drug treatment that must be considered is the possibility of an increased tendency to drug use in adolescence or adult life. Most of the current evidence indicates little danger of continued drug use into adolescence. In fact, some evidence suggests that use during childhood is an actual deterrent to later drug use. Parents must be made aware of the possibility of interaction with other medications frequently used during childhood, such as cold medicines, and cough syrups.

Several problems related to drug therapy which are frequently found in the literature must be mentioned here: 1. The routine prescription of amphetamines to children referred to physicians because of "school problems". 2. The lack of careful monitoring and follow-up with such children. 3. Frequently, drug therapy becomes the only therapy. 4. Subtle coercion in initiating drug therapy. Robin and Bosco reported only 22 percent of elementary teachers have ever been requested by a doctor to assist in the evaluation of the behavior of

a child taking Ritalin. In fact, direct contact with the doctor is reported as very infrequent when evaluating the effects of drugs. Yet research at the University of Illinois indicates that teachers can reliably tell the difference in changes of behavior caused by such small difference in dosages as 0.1 mg. to 0.3 mg. of Ritalin.

Although this discussion has centered around the use of amphetamines, other drugs such as antidepressants and tranquilizers are occasionally prescribed. Caffeine or coffee has also been proposed, but research evidence on this is very confusing since the stimulant has been administered in varying strengths and forms in almost every experiment.

The overriding advantage which drug treatment, when it is effective, has over all other forms of treatment is ease of administration and the rapidity with which results can readily be seen. The other types of treatments involve a certain expertise as well as expenditure of time on the part of parent or counselor. In addition to the time invested by the parent or counselor, the passage of several weeks or months before results are apparent is often necessary. The form of several psychotherapeutic and environmental manipulatice treatments will be briefly considered.

Another "treatment" frequently recommended is the Feingold diet, a diet which restricts sugars and articifial colorings. In some tests of this treatment, roughly 25 to 50 percent of the children did not respond. However, Feingold maintains this is so because some forbidden foods are still being consumed. Interestingly enough, some new evidence which links human aggression with the chemical balance of two or three chemical neurotransmitters has been reported. Besides the Feingold diet, there are advocates of vitamin and megavitamin therapy. The orthomolecular approach involves the administration of megavitamins (massive doses of vitamin B_3, niacin and vitamin C) appropriate

diet, exercise, psychotherapy as well as a thorough study of biochemical needs. In 1972, Hilsheimer made the following statement, "Only when the child has a normal internal environment can he grow and function; otherwise, the biochemical imbalance makes him unresponsive to practically all types of learning and leads him rapidly into worse behavior problems. Full re-education is made increditably difficult without correction of the biological dysfunction."

Behavior therapy is generally viewed as a four-step process:

1. The observation period is used to determine the child's base-line behavior.

2. The reinforcement period attempts to increase the time spent on a given activity, one minute of attending receives teacher attention in some instances.

3. The attention non-reinforcement period is a reversal stage which is designed to determine if the crucial factor in modifying behavior really is the adult reinforcement. In this stage teacher attention is delivered at random on a noncontingent basis.

4. The final period reinstates reinforcement procedures. Usually the criterion for teacher attention is raised. For example, two minutes of continuous attending in place of one minute.

Differential reinforcement has been successfully used in individual cases. When the problem is impulsivity instead of attentional a game called Quiz Program was developed. Points were given for the best answer additional points rewarded for the fastest best answer and points could be lost for incorrect or inadequate answers. This game was used only by parents and an older sibling, and the procedure was for them to model impulsivity with consequent punishment and reflectivity with subsequent positive reinforcement. Then the therapist extended the differential reinforcement procedure to the classroom where positive and negative social reinforcement was used with considerable success.

The teacher was so impressed that she began using this technique with several other impulsive children, thereby providing a peer modeling situation.

Modeling with guided participation has also been used to correct specific behavior which is triggering negative reactions from adults. This program is usually divided into two stages, a intensive training period usually contered around the home and a second stage where the treatment is extended into the school or the outside environment. As an example, extensive training was provided in the home involving the inhibition of touching or handling. The training concentrated on helping the child discriminate between situation where touching was mandatory (shaking hands, holding an object for someone), optional (giving a helping hand or an object, but under no obligation to do so), unnecessary and undesirable (when talking to or giving a message to someone), and forbidden (when visiting). In the early sessions, modeling by adults and an older brother was used; incompatible responses, such as keeping one's hands in one's pockets, physical barriers, stop lines on the floor were all used to establish boundaries so touching was impossible. Role-playing, demonstrations, discussions were also employed. As the training progressed, situational tests with immediate feedback were utilized. Score cards which when filled could be exchanged for a small prize were also used. The first phase lasted about four weeks. Phase Two involved cooperation with the teacher. Some of the same training was transferred to school. In addition, self-evaluation was included. The child was asked to keep track of his own behavior, notice how others reacted to it and notice inappropriate behavior on the part of other children and the consequences of that behavior.

Role-playing, filial therapy (helping mothers develop a feeling of empathy with their child) as well as brief therapy have all been utilized in the treatment of hyperactivity. In brief therapy, behavior is viewed as being maintained

and structured by interaction among family members, and peers and teachers in school. Therefore, the central question becomes, "What behaviors in the present system of interaction are operating to maintain the problem behavior? The therapist tries to isolate a specific complaint and a statement of a minimum goal for the treatment. In other words, what observable behavior change would be viewed as a success? The therapist then helps reframe the situation or redefine the problem situation in a way that will result in different, more acceptable behavior.

As education for the child with special needs has become more readily available, interest in educational programs for the hyperactive has increased. At the same time a report by Schaefer, Pales and Stewart (1974) suggests that once a child has been placed on drug therapy and his behavior falls within the acceptable range, parents become disinterested in other forms of intervention.

Frequently, the educational programs for such children can be described as minimal stimulation programs. These stimulus reduction programs usually utilize cubicles. The effectiveness of cubicles has been subjected to research evaluation. Several studies report that children who are easily distracted, or who have short attention spans, do accomplish more when they work in a cubicle than when they work in a normal classroom environment.

Several of the early theorists in special education who were dealing with brain-injured children advocated the stimulus reduction strategy which was logical since they maintained that distractibility was the major difficulty of such children. Recently, the stimulus reduction strategy has been seriously questioned in view of the work of several researchers. Studies in the early seventies suggested that hyperactive children need environmental stimulation as much as the average child and at least one study found that reducing stimulation actually increased restless activity. In fact recent research has tended to

give some support to those who maintain that a hyperactive child is functioning in a manner calculated to maintain the level of stimulation required for his physiological and psychological comfort. Teachers have long noted that hyperactive children are most active waiting their turn. This task involves little movement, possibly resulting in the effort of hyperactive children to maintain needed levels of stimulation. In fact, it is recognized by child psychologists that it is more difficult to inhibit responses than to generate them. Novel tasks do not produce more activity on the part of diagnosed hyperactive children. Drug therapy also offers some support to the optimum stimulation theory. Barbituates and depressants would normally be assumed to calm hyperactivity; instead, these drugs make the hyperactive child more restless.

At present, the components recommended for school programs for the hyperactive include structure, predictability, consistency of demands and consequences, as well as a logical step-by-step sequence for both academic tasks and behavioral expectations. It should be remembered that structure is not the same as rigidity where programs cannot be altered, and no allowances can be made for individual needs or unusual happenings.

The engineered classroom is also frequently recommended. Immediate reinforcement, step-by-step presentation, individual help are all features of this type of classroom. The disruptive child is not reprimanded. Instead, an interesting more attention demanding assignment is selected in terms of high interest. As long as the child works productively he is not penalized in terms of check marks which he receives on his Record Card. Transition -- a period of an hour or two -- is arranged whereby the child participates in a regular classroom.

Another educational program emphasizes a high level of parental involvement. This consists of an insight-oriented therapy group designed to help parents understand their feelings about the problem and facilitate changes in the family

structure that may be maintaining the problem. A course in the use of behavior modification techniques helps parents apply these principles in the home, assuring continuity of treatment between the home and school.

Douglas has completed a series of experiments that seem to have implications for teachers and researchers using behavior modification techniques. She found that for the hyperactive child praise should be taught, self-reinforcement procedures should be valuable, withdrawal of reward should be a gradual process, and mild negative reinforcement can be effective if used judiciously. Douglas cautions "the above findings have made us reluctant to place too heavy reliance on some of the more common techniques employed in reinforcement programs."

Self-instructional training has proven useful in a number of situations. This is typically used as a one-to-one situation and followed by a three-step program. The first step is the overt verbalization of an adult. The verbalization is used to control and direct the child's behavior. The second step has the child working with an adult, performing the same task as the adult provided step-by-step verbal and physical directions. Finally, in the third stage, the child is instructed to use covertly the verbalizations the adult had first modeled and that the child had used overtly.

A few studies have indicated that relaxation training and biofeedback have positive results with hyperactive children. However, research on these two approaches has been limited. Finally, there are those who remind educators of the responsibility of the school to meet children's needs and who urge the teacher of such a child to examine the classroom situation closely in order to determine if, by chance, the child in question might be a "situational hyperactive," that is, meeting frustration by displaying inappropriate behavior.

The words "behavior modification," "coercion," "drug therapy," and "abuse" produce strong emotional reactions. It seems apparent that until greater

knowledge of the psychological and neurobiological processes involved in learning, some constructive policies must be developed about the treatment of hyperactive children.

Hyperkinesis was "discovered" in the late fifties. One interesting sidelight to the epidemic of hyperactivity which burst upon us at about that time as that the treatment for the disorder had been available since 1937. Certainly it is a fact that pharmaceutical companies spent much time and money in the sixties promoting medications for this new disorder. Since that time physicians have accepted the description of disruptive or deviant behavior in the classroom, and parents and teachers have come to accept the argument that the child "can't help it, it's an organic problem." Stewart points out that drug therapy is basically pessimistic since it implies that the child cannot control his own behavior. Medication does often make the child less disruptive in the classroom. Today's social climate plays a role also. Teachers are under pressure to prove their competencies, and administrators and school boards are emphasizing control and management. A disruptive student can actually jeopardize a teacher's career. It is easy to understand the eagerness of some teachers to get specific children on medication.

In spite of these pressures, teachers need to be cautious about suggesting that a child is hyperactive. Frequently, this suggestion is tantamount to identification. It has been found that many families develop a relatively high level of tolerance for deviant behavior, and that the teacher is most often the one who initiates referral to a physician. At school, the identification is usually in terms of management or control problems and is usually made after some attempt by the school to manage the behavior has failed. In order for the school to use noneducational controls (medication), for disruptive behavior, the cooperation of the parents is necessary. Hyperactive children are rarely

referred if they can control themselves to the extent that only their own ability to function is curtailed.

Conrad has recently published an account of the diagnostic procedures at one clinic for hyperactive children. He notes that "the physical exam rarely creates evidence." For example, he quotes one pediatrician as saying, "I can't listen to his chest, take his blood pressure and say he's hyperactive. I'd never do that.....I have to know how he's doing in school, how his teacher sees him." Conrad goes on to say that the physician many times gives a retrospective reinterpretation of the child's history--"he gets into fights," "no punishment works with him."

It appears then that teachers who suggest hyperactivity as a possibility may in actual fact be so labeling the child. Therefore, it follows that when a teacher talks to the parent of such a child she needs to educate the parents about the need for a thorough physical examination including blood and urine tests. Parents need to know that hyperthroidis needs to be ruled out as does hyperglocemia and various metabolic problems. Speech, hearing and visual limitations need to be ruled out.

If drug therapy is indeed decided upon, the teacher should probably communicate to the parent what she observes in terms of effects upon the child. She needs to emphasize the desirability of close monitoring of the effects, the need for "vacations" from the drug so that undesirable side effects can be minimized and suggest that she would be willing to report to the physician the results of any change in dosage. Finally, and most important of all, the teacher of such a child needs to see that necessary basic skills are presented to the child once drug therapy appears to make attending possible. Drug therapy should not constitute the entire program for such children. If it does, then we are indeed aiding and abetting "management" programs. If parents are interested, a

teacher at the time of the original discussion with the parents might inform them of the other options available--diet and behavior modification.

It should not surprise anyone that doctors attempt to ameliorate or cure a condition by the use of drugs. In prescribing drugs, the doctor is simply utilizing his training just as teachers utilize books and lawyers utilize precedents. What does appear alarming, however, is the willingness of many physicians to prescribe drugs on the basis of school reports without first eliminating possible physical causes of the symptom and without determining the possible vulnerability of the patient to serious long-term side effects. The fact that complete physical examinations are becoming a luxury item makes the situation all the more disturbing.

Finally, ethical criteria for the employment of drugs in the control of social deviation need to be developed outside the framework of the medical/ pharamaceutical establishment.